WakeNet3-Greenwake

Workshop

Wake Vortex & Wind Monitoring Sensors in all weather conditions

DWD‘s new Remote Wind Sensing Equipment for an Integrated Terminal Weather System (ITWS)

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DWD - Facts and Figures (just a few)

Deutscher Wetterdienst (DWD) is the German National Meteorological Service

Statutory tasks:

- meteorological safeguarding of aviation and marine shipping
- warning of meteorological events that could endanger public safety and order
- fulfilment of international commitments the meteorological interests of Germany, e.g. WMO

2400 posts, 7 advisory centres for aviation, 844 weather reporting stations on board merchant ships . . .

183 main meteorological watch offices and weather stations 1,850 secondary weather and precipitation stations, 17 weather radar sites in Germany . . .

to produce p.a.

90,000 forecasts, 20,000 weather and severe weather warnings 510,000 forecasts and warnings for aviation 700,000 individual briefings for pilots 200,000 reports, warnings and advisory statements for marine shipping, coastal protection and offshore projects . . .

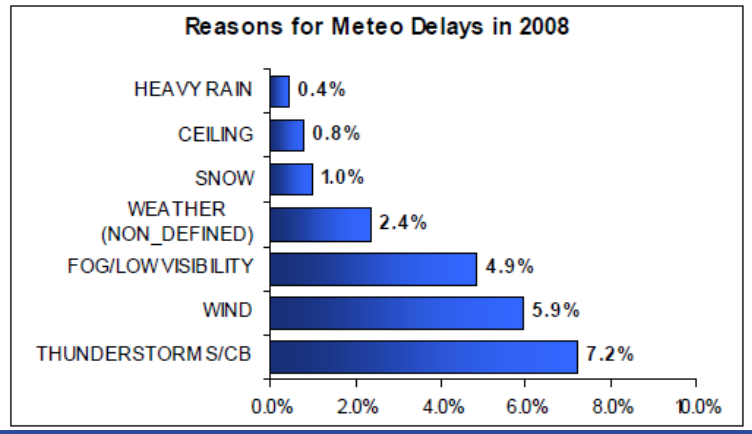
DWD Project ITWS

Introduction of an Integrated Terminal Weather System (ITWS) and a new Remote Wind Monitoring System at the airports in Frankfurt and Munich

Scope: To provide for the airports and the TMA weather predictions with the best possible spatiotemporal resolution which help to mitigate weather related delays in the air and on the ground

Deutscher Wetterdienst

Aeronautical Meteorology Department



Meteo delays accounted for 22.6% of all ATFCM delays. Within the Meteo delays, Thunderstorms & Wind make up 58.2% of this and contributes to 13.1% of all delays in 2008.

Weather impacts . . .

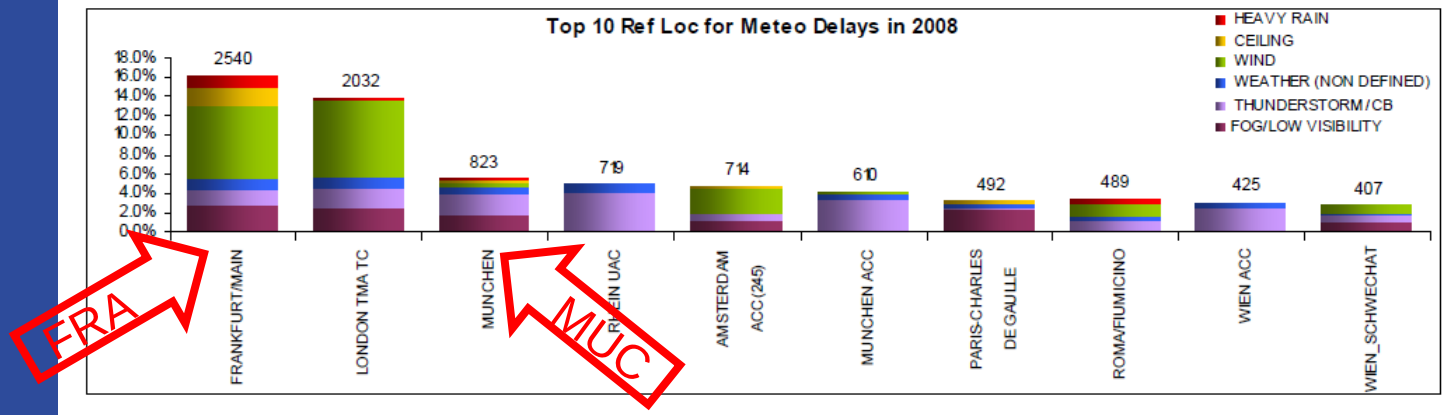
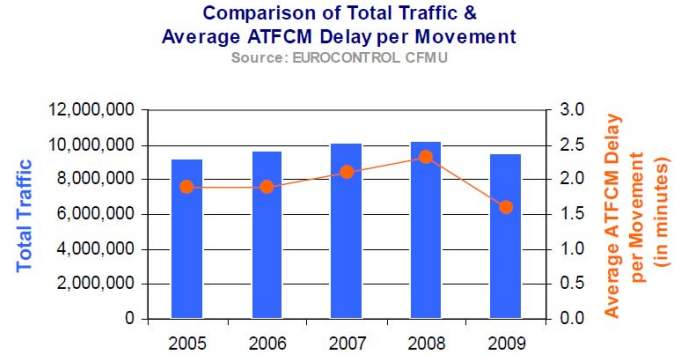


Figure 5-5 Top-10 Contributors to Meteo Delays

The major contributor for Meteo delays was Thunderstorms and CB activity, Germany was significantly affected by delays due to weather conditions. London TMA TC was mainly affected by Wind, fog and low visibility. Frankfurt airport experienced significant weather delays during the entire year.

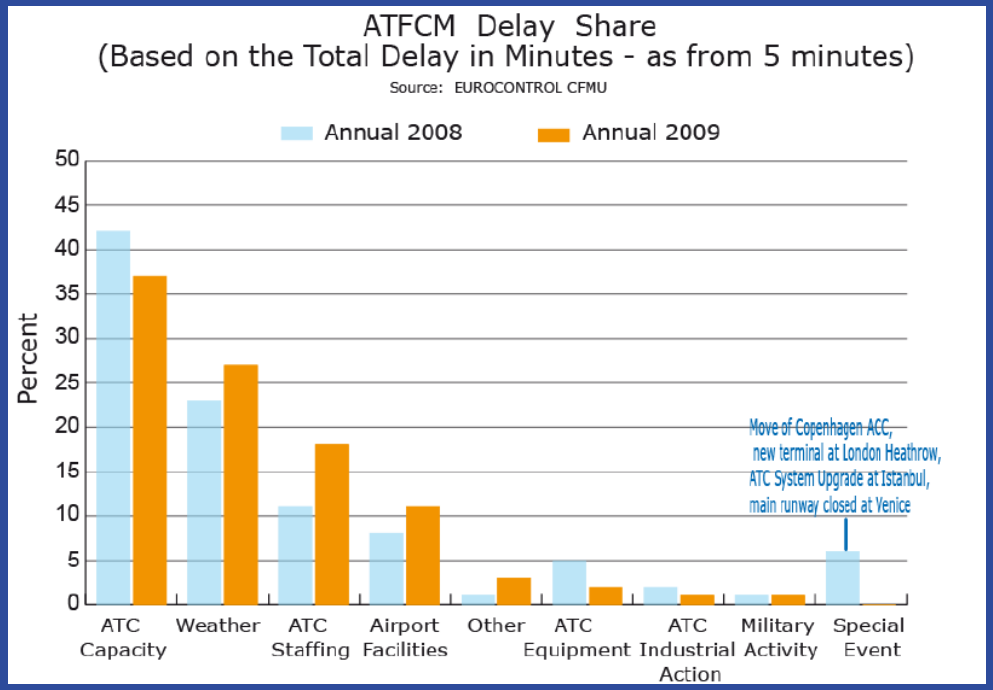
What is it all about?



The typical average value for the direct cost to airlines per minute of delay is 36€!

➔ **>500million€**

University of Westminster, May 2004, Evaluating the true cost to airlines of one minute of airborne or ground delay



Benefits expected from ITWS

Increase economic efficiency through minimizing of delays

Improve air traffic safety through avoidance of severe weather conditions

Reduce green house gas and noise emissions through less holdings

Gain passenger comfort through improved punctuality and calm flights

Through

Combination of new and existing measurements and forecast methods

Integration of automated numerical weather forecast products

New Remote Wind Sensing Equipment

Innovative Potential

Tailored automatically generated products that require no meteorological interpretation for air traffic personnel, airport management, ground services, pilots and airlines staff

… ITWS Concept

Data sources

Data processing

Data interfaces for user friendly weather products

AWOS/ ASDUV_E

RADAR

AMDAR

MSG Sat

Lightning

LLWAS

ITWS Realtime Data processing

NWP

Aeronautical meteorology

Airport Operations

Pilots & Airlines

Air Traffic Control

Wake Vortex

Identification & warning of wind hazards

- 3-D winds
- Wind shear & LLWAS
- Microburst & gust front
- Turbulence

Warning & forecast of weather critical to Airport operation (ITWS)

- Thunderstorms & lightning
- Low visibility & fog
- Snowfall and winter weather
- Wake vortices

… ICAO – Recommendation for introduction of LLWAS

ICAO Annex 3 *Met Service for Int'l Air Navigation*

Chapter 7: *SIGMET and AIRMET Information, Aerodrome Warnings and Wind shear Warnings and Alerts*

Wind shear Warnings

prepared by the meteorological office in when wind shear potentially affecting aircraft on approach or take-off path is observed or expected.

Wind shear Alerts

from automated, ground-based, remote-sensing equipment issued every minute

The DWD has purchased two Remote Wind Sensing System consisting of a LIDAR and an X-Band Radar including Central Processing Unit delivering all 3-D wind data including the LLWAS function for the terminal area radius > 10km. . . . . .

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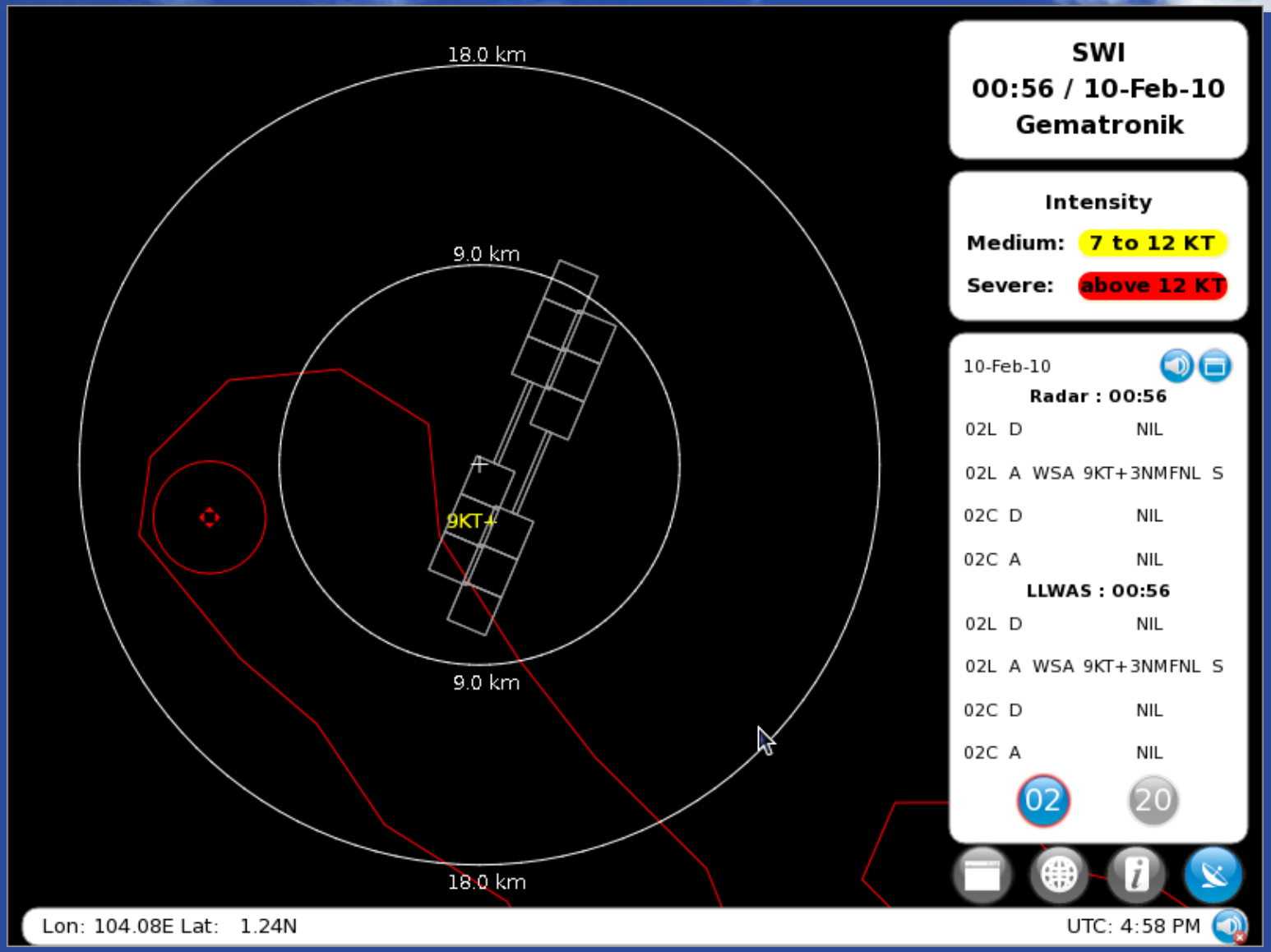
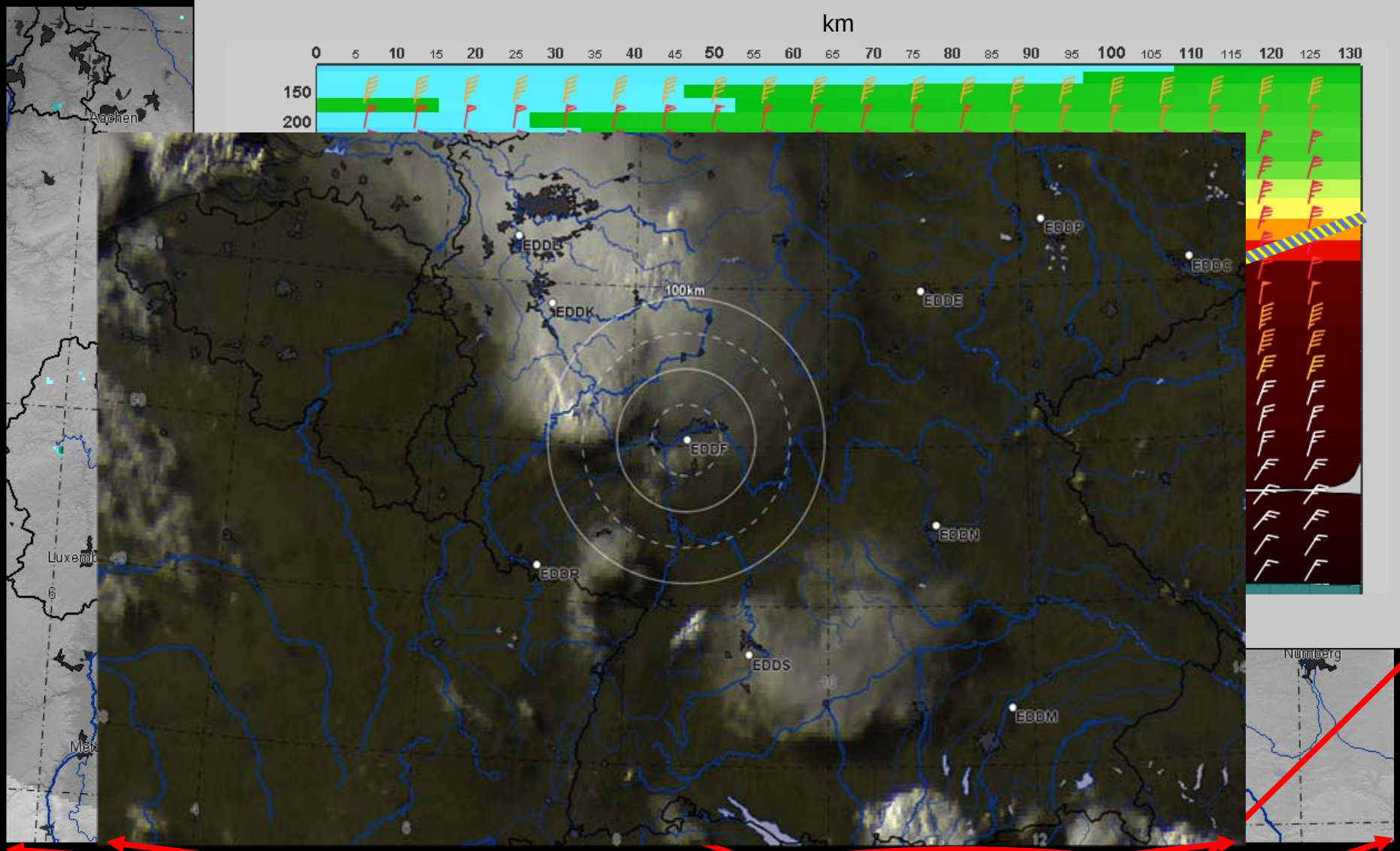
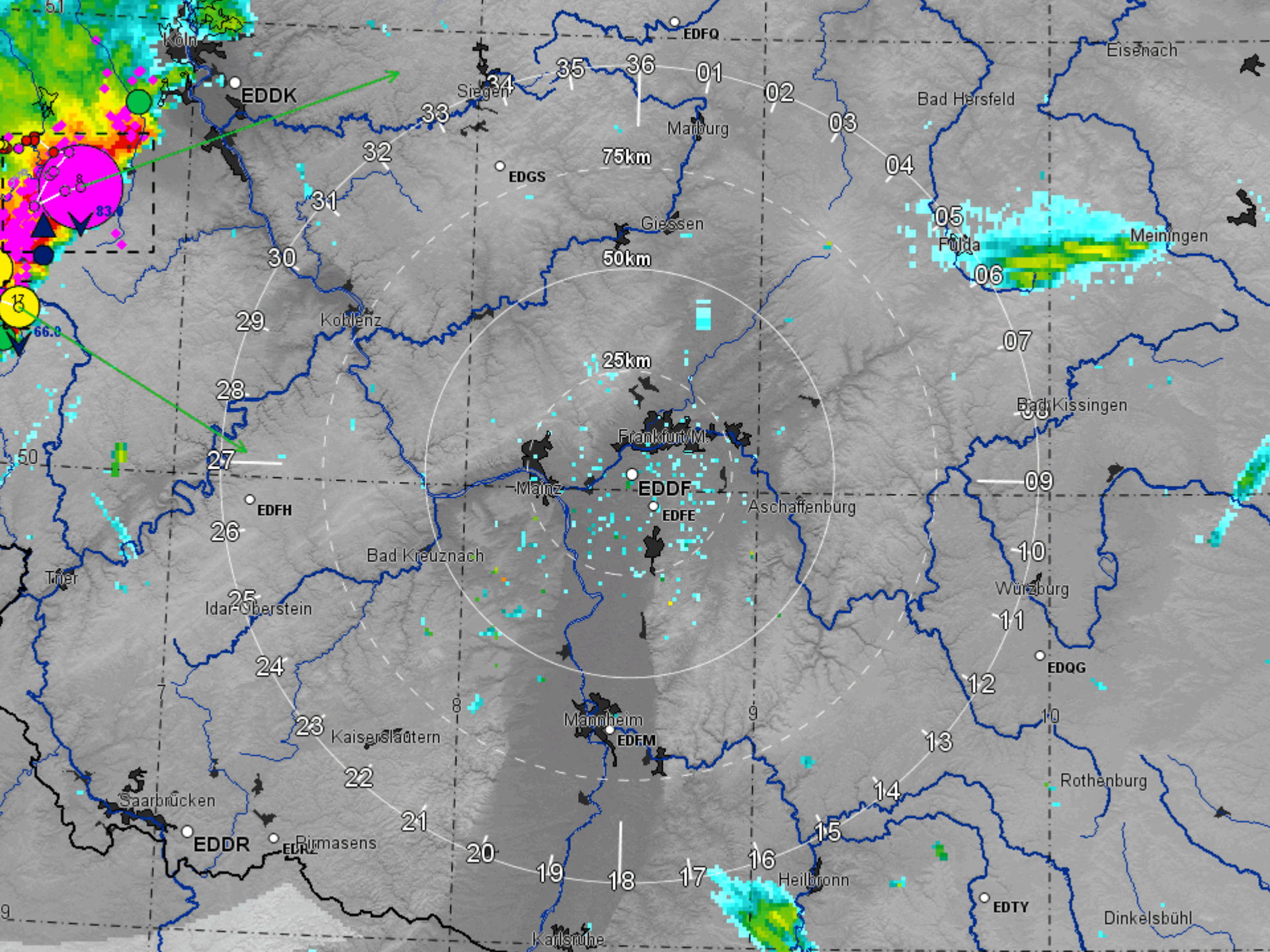




CURRENT OBS

Weather Report	SAT	RADAR	KONRAD	LIGHTNING	METAR/TAF

SECTOR OBS	Vertical Profile	25R/C/L	07R/C/L	18


EDFQ
Eisenach
Köln
EDDK
Siegen
Marburg
Bad Hersfeld
75km
EDGS
Giessen
Fulda
Meiningen
50km
Koblenz
25km
Bad Kissingen
Frankfurt/M.
Mainz
EDDF
EDFE
Aschaffenburg
EDFH
Bad Kreuznach
Trier
Idar-Oberstein
Würzburg
EDQG
Mannheim
EDFM
Kaiserslautern
Rothenburg
Saarbrücken
EDDR
Pirmasens
Heilbronn
EDTY
Dinkelsbühl
Karlsruhe

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data sources

Data processing

Data interfaces for user defined weather products

ASDUV_E

R...

...DAR

MSG Sat

Lightning

LLWAS

2010-11

2011-13

2010-12

Aeronautical meteorology

Airport

Pilots & Airlines

Air Traffic Control

Wake Vortex

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Thank You for Your Attention !